**Supplementary Table S1.** Nucleotide substitution model selection per gene and partitions selected by AIC (MrModeltest).

| Gene locus | Nuceotide substitution model (2nd best) |
|---|---|
| 28S rDNA | TIM3+I+G (GTR+I+G) |
| 60S ribosomal protein | TIM3+I+G (GTR+I+G) |
| β-tubulin | GTR+I+G |
| elongation factor 1-α | TIM3+I+G (GTR+I+G) |
| enolase | GTR+I+G |
| heat shock protein 90 | GTR+I+G |
| tigA gene fusion | TIM3+I+G (GTR+I+G) |

Nucleotide substitution models determined by MrModeltest v2.0 using the AIC, after creating partitions corresponding to each individual gene fragment for phylogenetic analysis.

**Supplemenatry Figure S1.** A multilocus phylogeny of *Phytophthora* showing the placement of the two *P. podocarpi* isolates in clade 15 along with downy mildew, *Peronospora hyoscyami* (*Peronospora tabacina*). Complete or partial DNA sequences from seven gene loci (28S rDNA, 60S ribosomal protein, β-tubulin, elongation factor 1-α, enolase, heat shock protein 90, tigA gene fusion) were used to infer phylogeny with MrBayes in Geneious Pro v9.0. Support is displayed as posterior probability values on the nodes. Scale bar shows number of substitutions per site.

Pythium undulatum P10342
Pythium vexans P3980
P. bohemeriae P6950
P. kernoviae NZFS3630
P. kernoviae P10681
P. kernoviae NZFS2646
P. cuyabensis P8213
P. lagoriana P8223
P. insolita P6195
P. polonica P15005
P. captiosa P10719
P. fallax P10725
P. quininea P3247
P. macrochlamydospora P10267
P. sansomea P3163
P. medicaginis P10683
P. trifolii P7010
P. drechsleri P10331
Pkelmania P10613
P. cryptogea P1088
P. erythroseptica P1699
P. richardiae P10811
P. syringae P10330
P. porri P10728
P. brassicae P10414
P. primulae P10333
P. foliorum P10969
P. hibernalis P3822
P. lateralis P3888
P. ramorum P10301
P. ramorum
P. uliginosa P10328
P. europeae P10324
P. fragariae P3821
P. cambivora P0592
P. alni P10568
P. cinnamomi pary P8495
P. cinnamomi P2159
P. cinnamomi NZFS3750
P. cinnamomi MP9498
P. niederhauserii P10617
P. sojae P3114
P. sojae
P. pistacae P6197
P. melonis P10994
P. sinensis P1475
P. vignae P3019
P. cajani P3015
Pinundata P8478
Phumicola P3826
Ppersonii P11555
Pmegasperma P3136
Pgonapodyides P10337
Pasparagi P10690
P. totara NZFS3642
P. totara NZFS3727
Peronospora tabacina 968-J2
Peronospora tabacina 968-S26
P. heveae P10167
P. katsurae P10187
P. agathidicida NZFS3770
P. agathidicida NZFS3772
P. pluvialis LC9-1
P. pluvialis NZFS3000
P. pseudosyringae P10437
P. nemorosa P10288
P. psychrophila P10433
P. ilicis P3939
P. multivesiculata P10410
P. bisheria P10117
P. citricola P7902
P. multivora NZFS3378
P. multivora NZFS3448
P. tropicalis P10329
P. glovera P10619
P. capsici P0253
P. mexicana P0646
P. infalata P10341
P. citrophthora P6310
P. meadii P6128
P. colocasiae P6317
P. botryosa P6945
P. quercina P10334
P. palmivora P0255
P. aracae P10213
P. megakarya P8516
P. quercetorum
P. pseudotsugae P10339
P. idaei P6767
P. hedralandra P11056
P. cactorum P0714
P. nicotianae P6303
P. tentaculata P8497
P. clandestina P3942
P. iranica P3882
P. phaseoli P10145
P. mirabilis P3005
P. ipomeae P10225
P. andina P13365
P. infestans P10650
P. infestans
0.03